Fact Sheet

NPDES Permit Number: ID-002646-8
Date: November 24, 1999
Public Notice Expiration Date: January 10, 2000
Technical Contact: Patty McGrath, (206) 553-0979
1-800-424-4372 (within Region 10)
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The U.S. Environmental Protection Agency (EPA) Proposes to Reissue a Wastewater Discharge Permit To:

Hecla Mining Company
Grouse Creek Unit
Challis, Idaho

and

the State of Idaho Proposes to Certify the Permit

EPA Proposes NPDES Permit Reissuance

EPA proposes to reissue the existing National Pollutant Discharge Elimination System (NPDES) permit to the Hecla Mining Company (Hecla). The draft permit sets conditions on the discharge of pollutants from the inactive Grouse Creek Mine facilities (the Grouse Creek Unit) to Jordan Creek. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a description of the current discharge
- a listing of proposed effluent limitations and other conditions
- a map and description of the discharge location
- background information supporting the conditions in the draft permit

The State of Idaho proposes certification and consistency determination.

The Idaho Division of Environmental Quality proposes to certify the NPDES permit for the Grouse Creek Unit under section 401 of the Clean Water Act.

Public Comment

Persons wishing to comment on or request a public hearing for the draft permit may do so in writing by the expiration date of the public notice. A request for a public hearing must state the nature of the issues to be raised, as they relate to the permit, as well as the requester's name, address, and telephone number. All comment and requests for public hearings must be in writing and submitted to EPA as described in the Public Comments section of the attached public notice. After the public notice expires, and all substantive comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance.

Persons wishing to comment on State certification should submit written comments by the public notice expiration date to the Idaho Division of Environmental Quality (IDEQ), Idaho Regional Falls Office, 900 N. Skyline, Idaho Falls, ID 83402.

If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless a request for an evidentiary hearing is submitted within 30 days.

Documents are available for review.

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (see address below). .

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-0523 or
1-800-424-4372 (within Alaska, Idaho, Oregon, and Washington)

The fact sheet and draft permit are also available at:

EPA Idaho Operations Office
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

Idaho Division of Environmental Quality
Idaho Falls Regional Office
900 N. Skyline
Idaho Falls, ID 83402
(208) 528-2650

Challis Public Library
Sixth and Main
Challis, ID 83226

The draft permit and fact sheet can also be found by visiting the Region 10 website at www.epa.gov/r10earth/water.htm.

For technical questions regarding the permit or fact sheet, contact Patty McGrath at the phone numbers or email address at the top of this fact sheet. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384 (ask to be connected to Patty McGrath at the above phone numbers). Additional services can be made available to person with disabilities by contacting Patty McGrath.

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LIST OF ACRONYMS

ACR	acute-to-chronic ratio
AML	Average Monthly Limit
BADT	Best Available Demonstrated Technology
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BE	Biological Evaluation
BMP	Best Management Practices
BO	Biological Opinion
BPJ	Best Professional Judgement
BPT	Best Practicable Control Technology
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CV	coefficient of variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	United States Environmental Protection Agency
GCU	Grouse Creek Unit
gpm	gallons per minute
IDEQ	Idaho Division of Environmental Quality
MDL	maximum daily limit
MZ	mixing zone
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NTR	National Toxics Rule
RP	Reasonable Potential
RPM	reasonable potential multiplier
SWPPP	Storm Water Pollution Prevention Plan
TSD	Technical Support Document (EPA 1991)
TSS	Total Suspended Solids
TU	Toxic Unit (TU_a = acute toxic unit, TU_c = chronic toxic unit)

LIST OF ACRONYMS

USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WAD	Weak Acid Dissociable
WET	Whole Effluent Toxicity
WLA	wasteload allocation

I. APPLICANT

Hecla Mining Company, Grouse Creek Unit
NPDES Permit No.: ID-002646-8

Mailing Address:	P.O. Box 647 Challis, Idaho 83226
Facility Location:	See Figure A-1 in Appendix A
Facility Contact:	Eric Lancaster, Assistant Unit Manager (208) 879-2304

II. FACILITY ACTIVITY

The Grouse Creek Unit (GCU) is a gold mine and mill located in Custer County, Idaho, approximately 19 miles northeast of Stanley (see Figure A-1). The mine and mill are owned and operated by the Hecla Mining Company (Hecla). The facility operated from December 1994 until April 1997 and is currently undergoing closure.

The GCU covers approximately 590 acres on both private lands and federal lands. The federal land area is managed by the U.S. Forest Service (Salmon-Challis National Forest). The mine facilities are located in the Grouse Creek, Pinyon Creek, Washout Creek, and Jordan Creek drainages. Grouse Creek, Pinyon Creek, and Washout Creek are tributaries to Jordan Creek which flows into the Yankee Fork of the Salmon River approximately 4 miles from the mine site. The Yankee Fork flows into the Salmon River approximately 8 miles from the confluence with Jordan creek (see Figure A-1).

Components of the facility that result in the generation of wastewater include mined areas and other disturbed areas, the Sunbeam mine adit, the waste rock storage area, and the tailings impoundment. A general description of these components is provided below.

Mine Water: The GCU includes two deposits of gold-bearing ore: the Sunbeam deposit and the Grouse Creek deposit. Mining of the Sunbeam deposit is completed, no mining of the Grouse Creek deposit has occurred. When operating, gold ore was mined primarily via open pit methods. Runoff from the mined areas and mine drainage from the inactive Sunbeam mine adit are routed to sediment ponds located below the tailings impoundment, prior to treatment and discharge via Outfall 002. See Section III. for a description of the treatment process.

Waste Rock Runoff and Seepage: Waste rock (rock that is removed from the mine in order to gain access to the ore) was deposited in an area adjacent to the Sunbeam pit in the upper Pinyon Creek drainage. The waste rock dump is currently undergoing reclamation. Underdrains constructed underneath the waste rock dump collect seepage. Seepage and runoff from the waste rock dump is routed to the "west ditch". The west ditch water flows to the wastewater treatment plant prior to discharge through Outfall 002.

Tailings Impoundment Wastewaters: During operations mined ore was processed at the mill by cyanide leaching to recover gold. Tailings (the residuals from leaching) were disposed in a lined tailings impoundment. The tailings impoundment was constructed in the Pinyon Creek basin and covers approximately 197 acres. The impoundment serves to separate the water and solids portions of the tailings via settling. During operations water was collected from the surface of the impoundment for reuse in the mill. The impoundment is lined with an underdrain system to collect seepage and groundwater. The underdrain water and runoff from the impoundment embankment flow to a collection pond at the base of the impoundment. Diversion ditches are used to reduce water inflow to the tailings impoundment. Portions of Washout Creek are diverted around the impoundment. Pinyon Creek is diverted around the impoundment via the west ditch.

The tailings impoundment was originally designed as a “zero discharge” facility with the capacity to contain all flows up to and including the probable maximum flood. No discharge of process water from the impoundment is allowed in the current permit. However, since the facility is undergoing closure, water is no longer drawn from the tailings impoundment for use in the mill. This accumulated water must be discharged in order to maintain the stability of the impoundment and to dewater the pond for reclamation.

In the spring of 1999, cyanide was detected in Jordan Creek at levels exceeding Idaho aquatic life water quality criteria. The major source of the cyanide was leakage from the tailings impoundment. EPA, the State of Idaho, the U.S. Forest Service, and Hecla are negotiating a Consent Order under the Comprehensive Environmental Response, Compensation, and Liability Act (also known as CERCLA or “Superfund”) to address these exceedences. The CERCLA Consent Order will require Hecla to dewater the tailings impoundment to eliminate leakage and facilitate reclamation. This discharge from the tailings impoundment is authorized under CERCLA and is not part of the draft NPDES permit.

Storm Water: Storm water run-off from most areas of the mine site (e.g., run-off from on-site roads, mined areas, and other disturbed areas) flow to the tailings impoundment or is routed through Outfall 002. Storm water is controlled through the use of best management practices (BMPs) as discussed in Section VIII.B., below. Storm water that is not routed through Outfall 002 is regulated under the Multi-Sector Storm Water General Permit.

III. OUTFALL DESCRIPTION

The current permit specifies two outfalls (outfalls 001 and 002). These outfalls and their status in the draft permit are discussed below.

Outfall 001: The current permit allows discharge from the tailings impoundment through Outfall 001 to Jordan Creek only on an emergency basis. Because the tailings impoundment will be dewatered under CERCLA, the Outfall 001 discharge is not longer needed and therefore is not included in the proposed permit.

Outfall 002: The facility is currently permitted to discharge wastewater through the dewatered Pinyon Creek channel to Jordan Creek. Outfall 002 discharges at a point in Jordan Creek approximately 3.2 miles upstream of its confluence with the Yankee Fork. A map of the outfall location is provided in Appendix A (Figure A-2). The sources of wastewater in the current Outfall 002 discharge include runoff and seepage from the waste rock dump, mine drainage from the Sunbeam adit, storm water, and, at times, wastewater from the tailings impoundment underdrains. Sources of wastewater in the Outfall 002 discharge under the proposed permit include the waste rock runoff and seepage, mine drainage, and storm water. The tailings impoundment underdrain water will be generally be discharged pursuant to the CERCLA action, although discharge will be allowed through Outfall 002 so long as effluent limits are met.

Wastewater is treated prior to discharge through Outfall 002. Treatment consists of hydroxide and sulfide precipitation and settling. Lime and sodium sulfide are added to mixed reactor tanks in the precipitation stage. Following precipitation, coagulant and flocculant are added to aid settling and the wastewater flows to a lined settling pond. The flow of wastewater from the settling pond for discharge through Outfall 002 is variable since the quantity of storm water, waste rock run-off, and mine drainage is highly dependent upon precipitation and snow melt. The average yearly discharge rate is 450 gpm (1 cfs) based on Hecla's NPDES permit application and supplemental information. Pollutants of concern in Outfall 002 include metals (arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc), cyanide, total suspended solids (TSS), and pH.

IV. FACILITY BACKGROUND

A. Permit Background

EPA first issued a National Pollutant Discharge Elimination System (NPDES) permit for the GCU effective on November 5, 1992. This permit expired on November 5, 1997. A timely application for renewal of the permit was submitted to EPA on September 17, 1992. Additional information related to the application was submitted to EPA on April 3, 1998, April 20, 1998, December 22, 1998, and July 15, 1999. Because Hecla submitted a timely application for renewal, the 1992 permit has been administratively extended and remains fully effective and enforceable until reissuance.

As discussed in Section II., above storm water may be routed to the tailings impoundment or to discharge through Outfall 002. Storm water that is not routed to these locations is discharged from the site pursuant to the Multi-Sector Storm Water General Permit (Permit number IDR 05A264).

B. NPDES Compliance History

In August of 1996, EPA Region 10 issued the facility an administrative complaint related to permit violations of mercury, cyanide, and TSS limits that occurred in May 1994 and between June 1995 and July 1996. The TSS exceedences were associated with high flows during spring runoff. The cyanide and mercury exceedences were the result of leakage of the tailings impoundment liner (July 1995) which was captured by the underdrains and a leak of the tailings slurry pipeline (August 1995). The violations were resolved through a Clean Water Act (CWA) Consent Order on December 12, 1996. The CWA Consent Order assessed a penalty of $21,250 (which was paid in a timely manner) and required the facility to construct a solids removal system to treat the wastewater. The Consent Order also included a compliance schedule for TSS in the Outfall 002 discharge which lowered the TSS limit to 15 mg/l until July 31, 1998.

The current wastewater treatment system was constructed and operating by May 1997 as required under the CWA Consent Order. There was one exceedence of the TSS interim limit (at 17.7 mg/l) in May 1998. Other than this exceedence, the Outfall 002 discharge has been in compliance with effluent limits since operation of the wastewater treatment system.

The CERCLA action related to the current tailings impoundment leakage was discussed in Section II.

V. RECEIVING WATERS

As discussed in Section III., Outfall 002 discharges to Jordan Creek. The *Idaho Water Quality Standards and Wastewater Treatment Requirements* designate beneficial uses and water quality criteria for waters of the State. The Idaho water quality standards do not specify beneficial uses for Jordan Creek. However, according to the Idaho water quality standards, undesignated waters are protected for cold water biota and primary or secondary contact recreation.

The State water quality standards specify water quality criteria that is deemed necessary to support the use classifications. These criteria may by numerical or narrative. The water quality criteria applicable to Jordan Creek are provided in Appendix B. These criteria provide the basis for most of the effluent limits in the draft permit.

VI. EFFLUENT LIMITATIONS

EPA followed the Clean Water Act (CWA), state and federal regulations, and EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control* (TSD) to develop the effluent limits in the draft permit. In general, the CWA requires that the effluent limit for a particular pollutant be the more stringent of either the technology-based limit or the water quality-based limit. Appendix B provides discussion on the legal basis for the development of technology-based and water quality-based effluent limits.

EPA sets technology-based limits based on the effluent quality that is achievable using readily available technology. The Agency evaluates the technology-based limits to determine whether they are adequate to ensure that water quality standards are met in the receiving water. If the limits are not adequate, EPA must develop additional water quality-based limits. Water quality-based limits are designed to prevent exceedances of the Idaho water quality standards in the receiving waters.

The proposed permit includes technology-based limits for total suspended solids (TSS), water quality-based and technology-based limits for pH, and water quality-based limits for metals, cyanide, and whole effluent toxicity (WET). Two sets of limits were developed to allow for seasonal variability of the effluent and receiving water (Jordan Creek) flows. Appendix B describes in detail how the effluent limits were developed. Table 1 compares the existing effluent limits with the proposed effluent limits in the draft permit. Following is a brief summary of the difference between the current and proposed effluent limits:

- Limits were not included in the draft permit for arsenic, iron, and nickel, since the water quality-based analysis indicted that there was no reasonable potential for these metals, at the concentrations discharged, to cause or contribute to an exceedence of water quality criteria in Jordan Creek.

- Limits were added for whole effluent toxicity (WET) based on state water quality standards that require surface waters to be free from toxic substances in concentrations that impair use classifications.

- The limits in the proposed permit are more stringent than those in the current permit. This is due, mainly, to two factors: (1) the allowable mixing zone size (dilution) was decreased from 100% of Jordan Creek flow to 25% for most constituents (no mixing zone was allowed for mercury and cyanide and compliance with acute criteria); and, (2) the effluent flow increased from the flow assumption used to develop the current permit limits.

- Except for pH and WET, the proposed effluent limits are expressed in terms of both mass (pounds/day) and concentration (ug/l). Establishment of mass-based limits ensures that total loadings to the receiving waters are controlled.

The conditions in the draft permit are based on non-operating conditions. If Hecla decides to reopen the mine, they will need to apply for a new permit.

Table 1: Effluent Limitations for Outfall 002

Parameter	units	Existing Effluent Limitations		Proposed Effluent Limitations[1]			
				Jordan Creek flows < 30 cfs		Jordan Creek flows $ 30 cfs	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
arsenic	ug/l	8780	4377	--	--	--	--
cadmium	ug/l	23.0	11.5	1.1	0.56	0.82	0.41[2]
	lb/day	--	--	0.0065	0.0033	0.017	0.0086
chromium	ug/l	4557	2271	16	8.0	16	8
	lb/day	--	--	0.095	0.047	0.34	0.17
copper	ug/l	185	92	7.3	3.0	4.8	2.0
	lb/day	--	--	0.043	0.018	0.10	0.042
iron	ug/l	46212	23035	--	--	--	--
lead	ug/l	39.3	19.6	2.0[2]	1.0[2]	2.6[2]	1.3[2]
	lb/day	--	--	0.012	0.0059	0.055	0.027
mercury	ug/l	0.6	0.3	0.020	0.0098	0.020	0.0098
	lb/day	--	--	0.00012	0.000058	0.00042	0.00021
nickel	ug/l	2998	1494	--	--	--	--
silver	ug/l	18.8	9.4	0.80[2]	0.40[2]	1.1	0.55[2]
	lb/day	--	--	0.0047	0.0024	0.023	0.012
zinc	ug/l	1353	674	53	23	110	46
	lb/day	--	--	0.31	0.14	2.3	0.96
cyanide	ug/l	200	120	8.1	4.4	8.1	4.4
	lb/day	--	--	0.048	0.026	0.17	0.092
TSS	mg/l	30	20	30	20	30	20
	lb/day	--	--	180	120	630	420
WET	TU_c	--	--	2.2	1.4	3.0	1.9
pH	su	within the range of 6.0-9.0		within the range of 6.5 - 9.0		within the range of 6.5 - 9.0	

Table 1: Effluent Limitations for Outfall 002
Footnotes: 1 - Metals concentrations to be measured as total recoverable, except for mercury which is to be measured as total. Cyanide to be measured as weak acid dissociable (WAD). 2 - These limits are not quantifiable using EPA approved analytical methods. Therefore, EPA will consider the permittee in compliance with the effluent limits when the concentration is at or below the Minimum Level (ML). The published MLs for these parameters are: cadmium - 0.5 ug/l, lead - 5 ug/l, silver - 1 ug/l.

VII. MONITORING REQUIREMENTS

A. Effluent Monitoring

Section 308 of the Clean Water Act and federal regulation 40 CFR 122.44(i) require that monitoring be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. Hecla is responsible for conducting the monitoring and reporting the results to EPA on monthly discharge monitoring reports (DMRs).

The effluent monitoring requirements in the draft permit are summarized in Table 2. The monitoring requirements are the same as included in the current permit with the following exceptions:

- No monitoring is required for arsenic, iron, and nickel since adequate data existed to determine that water quality-based effluent limits were not needed for these parameters.

- Monthly monitoring is included for selenium since Outfall 002 samples collected by EPA during compliance inspections indicated the presence of selenium and additional data is needed to determine the need for effluent limits in the future.

- Monthly monitoring is included for ammonia since it is a breakdown product of cyanide and additional data is needed to determine the need for effluent limits in the future.

- Monitoring flow in Jordan Creek is required to determine which flow tier and effluent limits are applicable.

Some of the water quality-based effluent limits in the draft permit fall below the capability of current analytical technology to detect and/or quantify (below method detection limits). EPA Region 10 guidance (EPA 1996a), addresses the establishment of permit limits that are less than detection levels. This guidance provides for the use of Minimum Levels (MLs) as the quantification level for use in laboratory analysis and reporting DMR data for compliance evaluations. MLs were established for some of the cadmium, lead, and silver effluent limits (see Table 1, footnote 2).

Table 2: Outfall 002 Monitoring Requirements			
Parameter	units	monitoring frequency	sample type
outfall flow	mgd	continuous	recording
effluent limited metals (cadmium, chromium, copper, lead, mercury, silver, zinc)	ug/l	weekly	grab
WAD cyanide	ug/l	weekly	grab
total suspended solids (TSS)	mg/l	weekly	grab
pH	su	daily	grab
selenium	ug/l	monthly	grab
ammonia	mg/l	monthly	grab
hardness, as $CaCO_3$	mg/l	monthly	grab
temperature	ºC	weekly	grab
Whole Effluent Toxicity (see Section VII.B., below)	TU_c	quarterly	24-hour composite
Jordan Creek Flow (location S-3)	cfs	weekly	--

B. Whole Effluent Toxicity Testing

Whole effluent toxicity (WET) tests are laboratory tests that replicate to the greatest extent possible the total effect and actual environmental exposure of aquatic life to effluent toxicants without requiring the identification of specific toxicants. WET tests use small vertebrate and invertebrate species, and/or plants, to measure the aggregate toxicity of an effluent. There are two different durations of toxicity tests: acute and chronic. Acute toxicity tests measure survival over a 96-hour test exposure period. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure.

Federal regulations at 40 CFR 122.44(d)(1) require that permits contain limits on whole effluent toxicity when a discharge has reasonable potential to cause or contribute to an exceedence of a water quality standard. In Idaho, the relevant water quality standards state that surface waters of the State shall be free from toxic substances in concentrations that impair designated beneficial uses (see Appendix B, Table B-2).

The current permit requires Hecla to conduct semiannual WET testing on the discharge from Outfall 002. In reissuing this permit, EPA has reviewed this data. The data show that the discharge has reasonable potential to contribute to an exceedence of State water quality standards for toxicity (see Appendix B for the reasonable potential analysis). Therefore, the draft permit contains limits on WET.

The draft permit requires Hecla to conduct quarterly WET testing of the effluent from Outfall 002. These tests will initially be conducted using three species, *Ceriodaphnia dubia* (water fleas), *Pimephales promelas* (fathead minnow) and *Selanastrum capricornatum* (green alga). After the first three suites of tests, WET testing will be conducted with the most sensitive species only. The tests will be conducted at a range of dilutions that mimic the effluent-receiving water mixing conditions. Results of these tests will be used to determine the chronic biological effects of the discharge and compliance with the WET effluent limits. In addition, if a WET limit is exceeded, the permit requires that Hecla conduct additional WET testing and a toxicity reduction evaluation.

C. Ambient Monitoring

The current permit requires Hecla to monitor receiving water quality upstream and downstream of Outfall 002 at ten locations in Jordan Creek and the Yankee Fork. Figure A-2 in Appendix A shows the location of the ambient monitoring stations. The monitoring requirements in the draft permit are largely the same as those in the existing permit. Specifically, the draft permit requires quarterly monitoring of the same monitoring locations for the effluent limited parameters (dissolved fractions of cadmium, chromium, copper, lead, silver, and zinc, total mercury, WAD cyanide, TSS, and pH), total selenium, ammonia, hardness, temperature, turbidity, and dissolved oxygen.

The receiving water quality monitoring data is used to evaluate the water quality impacts of the NPDES discharge. The data will also be used during the next permitting cycle to determine the need for incorporating and retaining water quality-based effluent limits into the permit. In order to perform this evaluation, it is necessary that the ambient monitoring use analytical methods that have method detection limits below the water quality criteria. Therefore, the draft permit specifies method detection limits for metals and cyanide required for surface water quality monitoring.

Hecla also monitors sediments and biota in the receiving water. This monitoring is conducted pursuant to the Comprehensive Water Quality Monitoring Plan approved by the U.S. Forest Service (USFS) and the State of Idaho Division of Environmental Quality (IDEQ). This monitoring includes annual fish population and species composition surveys at four locations in Jordan Creek upstream and downstream of the discharge and mine site influence, sediment particle size sampling at the same time and locations as the fish monitoring, and annual benthic macroinvertebrate surveys at the ten surface water monitoring locations. The draft permit does not include specific requirements for sediment and biological monitoring in Jordan Creek. Rather, the permit requires that the existing program, as approved by the USFS and IDEQ be continued.

D. Tailings Impoundment Monitoring

The current permit requires Hecla to monitor the tailings impoundment water for WAD cyanide and the tailings impoundment underdrains for flow, metals, cyanide (WAD and total), and pH. This monitoring has been removed from the draft permit since the tailings impoundment will be dewatered pursuant to the CERCLA action and such monitoring will be incorporated into the CERCLA action.

E. Representative Sampling

The draft permit has expanded the requirement in the federal regulations regarding representative sampling (40 CFR 122.41[j]). This provision now specifically requires representative sampling whenever a bypass, spill, or non-routine discharge of pollutants occurs, if the discharge may reasonably be expected to cause or contribute to a violation of an effluent limit under the permit. This provision is included in the draft permit because routine monitoring could miss permit violations and/or water quality standards exceedences that could result from bypasses, spills, or non-routine discharges. This requirement directs Hecla to conduct additional, targeted monitoring to quantify the effects of these occurrences on the final effluent discharge.

VIII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan

Federal regulations at 40 CFR 122.41(e) require permittees to properly operate and maintain their facilities, including "adequate laboratory controls and appropriate quality assurance procedures." The current permit required that Hecla develop a Quality Assurance Plan (QAP) to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The draft permit requires Hecla to update the QAP to reflect final permit conditions (such as required method detection limits). The QAP must include standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The draft permit requires Hecla to submit the revised QAP to EPA within 120 days of the effective date of the permit.

B. Best Management Practices Plan

Section 402 of the Clean Water Act and federal regulations at 40 CFR 122.44(k)(2) and (3) authorize EPA to require best management practices (BMPs) in NPDES permits. BMPs are measures that are intended to prevent or minimize the generation and the potential for release of pollutants from industrial facilities to waters of the U.S. These measures are important tools for waste minimization and pollution prevention.

The current permit required Hecla to develop a Storm Water Pollution Prevention Plan (SWPPP) that incorporated BMPs specific for storm water control. The draft permit requires Hecla to prepare a site-wide BMP Plan within 120 days of permit issuance. The BMP Plan may incorporate the SWPPP, updated to reflect final permit BMP requirements. The BMP Plan is intended to meet the following objectives: minimize the quantity of pollutants discharged from the facility, reduce the toxicity of discharges to the extent practicable, prevent the entry of pollutants into waste streams, and minimize storm water contamination.

The draft permit requires that the BMP Plan be maintained and that any modifications to the facility are made with consideration to the effect the modification could have on the generation or potential release of pollutants. The BMP Plan must be revised if the facility is modified and as new pollution prevention practices are developed.

C. Additional Permit Provisions

In addition to facility-specific requirements, sections III, IV, and V of the draft permit contain "boilerplate" requirements. Boilerplate is standard regulatory language that applies to all permittees and must be included in NPDES permits. Because the boilerplate requirements are based on regulations, they cannot be challenged in the context of an NPDES permit action. The boilerplate covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and general requirements.

IX. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. The Services have identified several listed threatened and endangered species (including salmon, steelhead trout, and bull trout) in the vicinity of the GCU discharge. EPA has initiated informal consultation with NMFS and the USFWS, including preparation of a Biological Evaluation to evaluate the potential impacts of the GCU discharge on the listed species. If the consultation results in reasonable and prudent measures or alternatives that require more stringent permit conditions, EPA will incorporate those conditions into the final permit. Appendix D provides further information on the listed species and the consultation process.

B. State Certification and Consistency Determination

Section 401 of the Clean Water Act requires EPA to seek certification from the State that the permit is adequate to meet State water quality standards before issuing a final permit. The regulations allow for the state to stipulate more stringent conditions in the permit, if the certification cites the Clean Water Act or State law references upon which that condition is based. In addition, the regulations require a certification to include statements of the extent to which each condition of the permit can be made less stringent without violating the requirements of State law.

Part of the State's certification is authorization of a mixing zone. The State water quality standards allow 25% of the receiving water to be used for dilution to meet chronic aquatic life criteria. Acute criteria must be met within a zone of initial dilution. In the absence of modeling to demonstrate that the acute criteria are met within the zone of initial dilution, no mixing zone was allowed for acute criteria. The draft permit has been sent to the State to begin the final certification process. If the State does not certify the mixing zone, EPA will recalculate the permit limitations based on meeting water quality standards at the point of discharge (zero dilution).

Most of the effluent limits in the draft permit are more stringent than the limits in the current permit. The State water quality standards includes a provision for compliance schedules which allow a discharger to phase in, over time, compliance with new water quality-based limits. Any compliance schedule must be included in the State certification. EPA is working with the State to determine the need for a compliance schedule in the final permit.

C. Antidegradation

In setting permit limitations, EPA must consider the State's antidegradation policy. This policy is designed to protect existing water quality when the existing quality is better than that required to meet the standard and to prevent water quality from being degraded below the standard when existing quality just meets the standard. For high quality waters, antidegradation requires that the State find that allowing lower water quality is necessary to accommodate important economic or social development before any degradation is authorized. This means that, if water quality is better than necessary to meet the water quality standards, increased permit limits can be authorized only if they do not cause degradation or if the State makes the determination that it is necessary.

Because the effluent limits in the draft permit are based on current water quality criteria or technology-based limits that have been shown to not cause or contribute to an exceedence of water quality standards, the discharge as authorized in the draft permit does not result in degradation of the receiving water. In addition, the effluent limits are more stringent than those in the current permit. Therefore, the conditions in the permit will comply with the State's antidegradation requirements.

D. Permit Expiration

This permit will expire five years from the effective date of the permit.

APPENDIX A - GROUSE CREEK UNIT MAPS

APPENDIX B - DEVELOPMENT OF EFFLUENT LIMITATIONS

This section discusses the basis for, and the development of, effluent limits in the draft permit. This section includes: an overall discussion of the statutory and regulatory basis for development of effluent limitations (Section I); discussion of the development of technology-based effluent limits (Section II) and water quality-based effluent limits (Section III); and, a summary of the effluent limits developed for this draft permit (Section IV).

I. Statutory and Regulatory Basis for Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act (CWA) provide the basis for the effluent limitations and other conditions in the draft permit. EPA evaluated the discharge with respect to these sections of the Clean Water Act (CWA) and the relevant National Pollutant Discharge Elimination System (NPDES) regulations to determine which conditions to include in the draft permit.

In general, the EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls, to see if it could result in any exceedances of the water quality standards in the receiving water. If exceedances could occur, EPA must include water quality-based limits in the permit. The proposed permit limits will reflect whichever requirements (technology-based or water quality-based) are more stringent.

II. Technology-based Evaluation

Section 301(b) of the CWA requires technology-based controls on effluents. This section of the Clean Water Act requires that, by March 31, 1989, all permits contain effluent limitations which: (1) control toxic pollutants and nonconventional pollutants through the use of "best available technology economically achievable" (BAT), and (2) represent "best conventional pollutant control technology" (BCT) for conventional pollutants. In no case may BCT or BAT be less stringent than "best practical control technology currently achievable" (BPT), which is the minimum level of control required by section 301(b)(1)(A) of the Clean Water Act. Sections 301(b)(2) and (3) require further technology-based controls on effluent. After March 31, 1989, all permits for new sources are required to contain effluent limitations for all categories of point sources which control toxic pollutants through the use of best available demonstrated technology (BADT). BADT is specifically applied through New Source Performance Standards (NSPS).

In many cases, BPT, BAT, BCT, and NSPS limitations are based on effluent guidelines developed by EPA for specific industries. On December 3, 1982, EPA published effluent guidelines for the mining industry. These guidelines are found in 40 CFR 440. Effluent guidelines applicable to gold mines, such as the Grouse Creek Unit are found in the Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory (Subpart J) of Part 440. Because the GCU was constructed after promulgation of the NSPS, the NSPS in Part 440.104 are applicable to the facility. The Part 440 guidelines define mines as "active" facilities. Even though the GCU is not currently operating, the characteristics of the Outfall 002 discharge are similar to those of an active mine (specifically the mine drainage from the Sunbeam adit which is a component of the discharge). Therefore, EPA has determined, based on best professional judgement (BPJ), that the technology-based limits applicable to the Outfall 002 discharge are the NSPS effluent guidelines shown in Table B-1. The NPDES regulations at 40 CFR 122.44 and 125.3 require determination of permit conditions using BPJ in the absence of applicable effluent guidelines.

TABLE B-1: Technology-Based Effluent Limitations (40 CFR 440.104) for Outfall 002

Effluent Characteristic	Effluent Limitations	
	daily maximum	monthly average
cadmium, ug/l	100	50
copper, ug/l	300	150
lead, ug/l	600	300
mercury, ug/l	2	1
zinc, ug/l	1500	750
TSS, mg/l	30	20
pH, su	within the range 6.0 - 9.0	

III. Water Quality-based Evaluation

In addition to the technology-based limits discussed above, EPA evaluated the GCU's discharge to determine compliance with Section 301(b)(1)(C) of the CWA. This section requires the establishment of limitations in permits necessary to meet water quality standards by July 1, 1977.

The regulations at 40 CFR 122.44(d) implement section 301(b)(1)(C) of the CWA. These regulations require that permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality." The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

In determining whether water quality-based limits are needed and developing those limits when necessary, EPA follows guidance in the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991). The water quality-based analysis consists of four steps:

1. Determine the appropriate water quality criteria (see Section III.A., below)
2. Determine if there is "reasonable potential" for the discharge to exceed the criteria in the receiving water (see Section III.B.)

3. If there is “reasonable potential”, develop a WLA (see Section III.C.)
4. Develop effluent limitations based on the WLA (see Section III.C.)

The following sections provide a detailed discussion of each step. Appendix C provides an example calculation to illustrate how these steps are implemented.

A. Water Quality Criteria

The first step in developing water quality-based limits is to determine the applicable water quality criteria. For Idaho, the State water quality standards are found at IDAPA 16, Title 1, Chapter 2 (IDAPA 16.01.02). The applicable criteria are determined based on the beneficial uses of the receiving water. As discussed in Section V. of the Fact Sheet, Jordan Creek is undesignated. According to the Idaho water quality standards, the following uses apply to undesignated waters: cold water biota and primary or secondary contact recreation (IDAPA 16.01.02101.01.a.)

For any given pollutant, different uses may have different criteria. To protect all beneficial uses, the permit limits are based on the most stringent of the water quality criteria applicable to those uses. The applicable criteria based on the above uses are summarized in Tables B-2 and B-3.

Idaho’s aquatic life criteria for several of the metals of concern are calculated as a function of hardness measured in mg/l of calcium carbonate ($CaCO_3$). As the hardness of the receiving water increases, the toxicity decreases and the numerical value of the criteria decreases. The hardness used to calculate the criteria is the hardness at the edge of the mixing zone (receiving water hardness), so long as that hardness is between 25 mg/l $CaCO_3$ and 400 mg/l $CaCO_3$. Where receiving water hardness is less than 25 mg/l $CaCO_3$, then 25 mg/l $CaCO_3$ is used for the receiving water hardness (per the National Toxics Rule - see footnote 1 of Table B-2 for citation). Water quality-based effluent limits were developed for both high and low flow conditions in Jordan Creek. Therefore, receiving water hardness was determined for both high and low flow conditions. The hardness was determined by calculating the 5th percentile of the hardness values measured by Hecla at Jordan Creek monitoring location S-4 (downstream of Outfall 002) since 1994 (when discharge from Outfall 002 commenced). The hardness values are 16 mg/l $CaCO_3$ for high flow (5th percentile of hardness values measured at S-4 during May and June) and 39 mg/l $CaCO_3$ for low flow (5th percentile of hardness values measured over the rest of the year). Since the high flow value is less than the minimum allowed to calculate the criteria, the value of 25 mg/l $CaCO_3$ was used to calculate the hardness-based criteria under high flow conditions. The equations for the hardness-based criteria and the criteria calculations are shown in Table B-3.

In addition to the calculation for hardness, Idaho’s criteria for some metals include a “conversion factor” to convert from total recoverable to dissolved criteria. Conversion factors address the relationship between the total amount of metal in the water column (total recoverable metal) and the fraction of that metal that causes toxicity (bioavailable metal). Conversion factors for most of the dissolved criteria are shown in Table B-3.

Table B-2: Water Quality Criteria Applicable to Outfall 002

Parameter, µg/l unless otherwise noted	Cold Water Biota - Aquatic Life Criteria[1]		Primary and Secondary Contact Recreation Criteria (consumption of organisms)[2]
	Acute Criteria	Chronic Criteria	
Arsenic	360	190	50
Cadmium	see Table B-3	see Table B-3	NA
Chromium III	see Table B-3	see Table B-3	NA
Chromium VI	16	11	NA
Copper	see Table B-3	see Table B-3	NA
Lead	see Table B-3	see Table B-3	NA
Mercury	2.0	0.012	0.15
Nickel	see Table B-3	see Table B-3	4600
Selenium	20	5	NA
Silver	see Table B-3	NA	NA
Zinc	see Table B-3	see Table B-3	NA
Cyanide, WAD[3]	22	5.2	220,000
pH (s.u.)	within the range of 6.5 - 9.5		NA
WET (TU)	surface waters shall be free from toxic substances in concentrations that impair designated uses[4]		

Footnotes:

1 - The aquatic life criteria are based on IDAPA 16.01.02250.02. This section cites the National Toxics Rule (NTR), 40 CFR 131.36(b)(1) and the NTR subparts for toxics (metals and cyanide). The aquatic life criteria for arsenic, cadmium, chromium, copper, lead, mercury (acute only), nickel, silver, and zinc are expressed as the dissolved fraction of the metal. The aquatic life criteria for cadmium, chromium III, copper, lead, nickel, silver, and zinc are calculated as a function of hardness and are shown in Table B-3.

2 - The recreation criteria are based on IDAPA 16.01.02250.01., which cites the NTR (except for arsenic which is specified as 50 ug/l in the Idaho standards).

3 - The cyanide criteria is expressed as weak acid dissociable (WAD), per IDAPA 16.01.02250.07.a.iv.

4 - EPA's recommended magnitudes for this narrative criterion are 1 TU_c and 0.3 TU_a for the chronic and acute criteria, respectively (TSD 1991). TU means toxicity units, where TU_c is equal to the reciprocal of the effluent concentration that causes no observable effect in a chronic toxicity test and TU_a is the reciprocal of the effluent concentration that causes 50% mortality in an acute toxicity test.

Table B- 3: Hardness-Based Water Quality Criteria Applicable to Outfall 002

Parameter	Hardness-Based Aquatic Life Criteria (H = hardness)			Dissolved Criterion, ug/l (total criterion x conversion factor)	
				for Jordan Creek flows < 30 cfs (H = 39 mg/l)	for Jordan Creek flows $ 30 cfs (H= 25 mg/l)
Cadmium	acute	conv. factor	1.136672 - (0.041838)lnH	1.3	0.82
		criterion (total)	exp [(1.128(lnH) - 3.828]		
	chronic	conv. factor	1.101672 - (0.041838)lnH	0.51	0.37
		criterion (total)	exp [(0.7852)lnH - 3.490]		
Chromium III	acute	conv. factor	0.316	250	180
		criterion (total)	exp [(0.818)lnH + 3.688]		
	chronic	conv. factor	0.86	82	57
		criterion (total)	exp [(0.818)lnH + 1.561]		
Copper	acute	conv. factor	0.960	7.0	4.6
		criterion (total)	exp [(0.9422)lnH - 1.464]		
	chronic	conv. factor	0.960	5.1	3.5
		criterion (total)	exp [(0.8545)lnH -1.465]		
Lead	acute	conv. factor	1.46203 - (0.145712)lnH	23	14
		criterion (total)	exp [(1.273)lnH - 1.460]		
	chronic	conv. factor	1.46203 - (0.145712)lnH	0.89	0.54
		criterion (total)	exp [(1.273)lnH - 4.705]		
Nickel	acute	conv. factor	0.998	640	440
		criterion (total)	exp [0.846(lnH) + 3.3612]		
	chronic	conv. factor	0.997	71	49
		criterion (total)	exp [0.846(lnH) + 1.1645]		
Silver	acute	conv. factor	0.85	0.68	0.32
		criterion (total)	exp [1.72(lnH) - 6.52]		
Zinc	acute	conv. factor	0.978	52	35
		criterion (total)	exp [0.8473(lnH) + 0.8604]		
	chronic	conv. factor	0.986	47	32
		criterion (total)	exp [0.8473(lnH) + 0.7614]		

B. Reasonable Potential Evaluation

To determine if there is “reasonable potential” to cause or contribute to an exceedence of water quality criteria for a given pollutant (and therefore whether a water quality-based effluent limit is needed), for each pollutant present in a discharge, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is “reasonable potential”, and a limit must be included in the permit. EPA uses the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct this “reasonable potential” analysis. This section discusses how reasonable potential is evaluated.

The maximum projected receiving water concentration is determined using the following mass balance equation.

$$C_d \times Q_d = (C_e \times Q_e) + (C_u \times Q_u)$$

solving for C_d:

$$C_d = \frac{(C_e \times Q_e) + (C_u \times Q_u)}{Q_d}$$

where,

C_d = receiving water concentration downstream of the effluent discharge (concentration at the edge of the mixing zone)
C_e = maximum projected effluent concentration
C_u = receiving water upstream concentration of pollutant
Q_e = effluent flow
Q_u = receiving water upstream flow
Q_d = receiving water flow downstream of the effluent discharge = $(Q_e + Q_u)$

If a mixing zone is allowed, the mass balance equation becomes:

$$C_d = \frac{(C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)} \qquad \text{(Equation 1)}$$

where,

MZ = the percent mixing zone based on receiving water flow

Where no mixing zone is allowed, $C_d = C_e$ (Equation 2)

For some of the metals of concern the aquatic life water quality criteria are expressed as dissolved (see Table B-2, footnote 1). Yet effluent concentrations and NPDES permit limits are expressed as total recoverable metals. The dissolved metal is the concentration of an analyte that will pass through a 0.45 micron filter. Total metal is the concentration of analyte in an unfiltered sample. To account for the difference between total effluent concentrations and dissolved criteria, “translators” are used in the reasonable potential (and permit limit derivation) equations. Translators can either be site-specific numbers or default numbers. EPA guidance related to the use of translators in NPDES permits is found in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996). In the absence of site-specific translators, this guidance recommends the use of the water quality criteria conversion factors (see Table B-3) as the default translators. Because site-specific translators were not available, the conversion factors were used as default translators in the reasonable potential and permit limit calculations for the Outfall 002 discharge. Therefore, for those metals with criteria expressed as dissolved, Equations 1 and 2 become:

where mixing zone allowed: $$C_d = \frac{\text{translator} \times (C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)} \quad \text{(Equation 3)}$$

where no mixing zone is allowed: $$C_d = \text{translator} \times C_e \quad \text{(Equation 4)}$$

After C_d is determined, it is compared to the applicable water quality criterion. If C_d is greater than the criterion, a water quality-based effluent limit is developed for that parameter.

The following discusses each of the factors used in the mass balance equations to calculate C_d. A summary of the results of the reasonable potential analysis for the parameters measured in Outfall 002 is provided in Table B-5. An example of the reasonable potential determination for cadmium in Outfall 002 is provided in Appendix C to demonstrate the reasonable potential analysis.

C_e (maximum projected effluent concentration): Per the TSD, the maximum projected effluent concentration in the mass balance equation is represented by the 99th percentile of the effluent data. The 99th percentile is calculated using the statistical approach recommended in the TSD, i.e., by multiplying the maximum measured effluent concentration by a reasonable potential multiplier (RPM):

$$C_e = (\text{maximum measured effluent concentration}) \times \text{RPM} \quad \text{(Equation 5)}$$

The RPM accounts for uncertainty in the effluent data. The RPM depends upon the amount of effluent data and variability of the data as measured by the coefficient of variation (CV) of the data. When there are not enough data to reliably determine a CV, the TSD recommends using 0.6 as a default value. Once the CV of the data is determined, the RPM is determined using the statistical methodology discussed in Section 3.3 of the TSD.

Maximum reported effluent concentrations, CVs, and RPMs used in the reasonable potential calculations were based on data collected by Hecla (DMR data) and EPA (compliance inspection data) since May of 1997. The wastewater treatment plant began operating in May 1997, so the samples collected since then are most representative of the effluent discharged. See Table B-4, for a summary of maximum reported effluent concentrations, CVs, and RPMs used in the reasonable potential analysis.

The determination of C_e for WET must take into account the different units in which toxicity is expressed. The whole effluent toxicity (WET) tests conducted on the 002 effluent were chronic tests, therefore the effluent toxicity is expressed in chronic toxic units (TU_c). Results of chronic WET tests conducted since May of 1997 were used to determine reasonable potential to exceed the chronic WET criterion. To determine reasonable potential to exceed the acute WET criterion, the chronic test results must be converted to acute toxic units (TU_a) using an acute-to-chronic ratio (ACR). A site-specific ACR may be developed using the results of acute and chronic toxicity tests. Where a site-specific ACR is not available, the TSD recommends using a default ACR of 10. Since a site-specific ACR was not available for the Outfall 002 effluent, the default ACR of 10 was used. Therefore, C_e in TU_a is determined by dividing C_e (in TU_c) by 10.

<u>C_u (upstream concentration of pollutant)</u>: The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge point. Where sufficient data exists, the 95th percentile of the ambient data is generally used as an estimate of reasonable worst-case.

EPA reviewed the ambient data collected by Hecla since 1994 to calculate C_u. Monitoring data from location S-3, upstream of Outfall 002 (see Figure A-2) was used to determine ambient concentrations. A problem encountered in evaluating the ambient data was that most of the data was reported as non-detect and in some cases the detection limits exceeded the water quality criteria. For parameters where all the values were reported at, or less than, detection limits (such as most of the dissolved metals concentrations), zero was used as the upstream concentration. For other parameters, the upstream concentration was calculated as the 95th percentile of the data collected with a value of ½ the method detection limit assumed for non-detects. Table B-4 presents the upstream concentrations used in the reasonable potential analysis.

<u>Q_u (upstream flow)</u>: The upstream flow used in the mass balance equation depends upon the criterion that is being evaluated for reasonable potential. The flows used to evaluate compliance with the water quality criteria are:

- The 1-day, 10-year low flow (1Q10) is used for the protection of aquatic life from acute effects. It represents the lowest daily flow that is expected to occur once in 10 years.

- The 7-day, 10-year low flow (7Q10) is used for the protection of aquatic life from chronic effects. It represents the lowest 7-day average flow expected to occur once in 10 years.

- The 30-day, 5-year low flow (30Q5) is used for the protection of human health (recreational and domestic uses) and agricultural uses from non-carcinogens. It represents the 30-day average flow expected to occur once in 5 years.

- The harmonic mean flow is a long-term average flow and is used for the protection of human health and agricultural uses from carcinogens. It is the number of daily flow measurements divided by the sum of the reciprocals of the flows.

Hecla has been monitoring flow in Jordan Creek upstream of Outfall 002 (monitoring location S-3) two to four times a year since 1987. This does not provide an adequate amount of flow data to determine the 1Q10, 7Q10, and 30Q5 flows. Therefore, the lowest flow on record (1.2 cfs) was used to represent the low flow conditions in the reasonable potential analysis and development of water quality-based effluent limits.

Jordan Creek flow varies dramatically with precipitation and snow melt, with peak flows occurring in May and June. Effluent flow from Outfall 002 exhibits similar seasonal variations. Therefore, effluent limits were developed representative of both low flow and high flow conditions. As discussed above, the receiving water flow used for low flow conditions is 1.2 cfs. The receiving water flow used for high flow conditions is 30 cfs which represent the lowest flows recorded at S-3 during the peak flow months of May and June.

Q_e (effluent flow): The effluent flow in the mass balance equation is the maximum effluent flow. As mentioned above, the Outfall 002 effluent flow exhibits seasonal variations. Therefore, different effluent flows were used to determine reasonable potential for the high and low flow conditions. The maximum effluent flows representative of high flow (May and June) and low flow (remainder of the year) conditions are 1750 gpm (3.9 cfs) and 500 gpm (1.1 cfs), respectively. These flows are based on modeling reported by Hecla in information supplemental to their NPDES permit application.

MZ (the percent mixing zone based on receiving water flow): The Idaho water quality standards at IDAPA 16.01.02060 allow 25% of the receiving water to be used for dilution for chronic aquatic life criteria. Acute aquatic life criteria may be exceeded within a zone of initial dilution inside the mixing zone. The standards are silent as to which flow should be used for human health criteria. EPA uses 100% of the receiving water for dilution for recreational criteria, since the flow limitation for aquatic life is to account for fish passage.

Based on the Idaho water quality standards and the presence of threatened and endangered species in the receiving waters, the following mixing zones were used to determine reasonable potential and calculate effluent limits:

WAD cyanide - No mixing zone was allowed for aquatic life criteria since upstream concentrations in Jordan Creek exceed the chronic aquatic life criteria.

chronic aquatic life criteria - 25% of Jordan Creek low flow volume was allowed for dilution, except for mercury and cyanide. Cyanide is discussed above. No mixing zone was allowed for mercury due to the potential for the metal to bioaccumulate (at the recommendation of the USFWS, no mixing zones allowed for bioaccumulative compounds to ensure protection of endangered species).

acute aquatic life criteria - No mixing zone was allowed since modeling was not available to verify the zone of initial dilution concentrations and acute toxicity must be prohibited to ensure protection of endangered species.

recreational criteria - 100% mixing zone for all parameters

If IDEQ authorizes different size mixing zones in its final 401 certification, EPA will recalculate the reasonable potential and effluent limits based on the final mixing zones. If the State does not authorize a mixing zone in its 401 certification, EPA will recalculate the limits based on meeting water quality criteria at the point of discharge (i.e., "end-of-pipe" limits).

Reasonable Potential Summary: A summary of the data used to determine reasonable potential is provided in Table B-4. Results of the reasonable potential analysis is provided in Table B-5. Based on the reasonable potential analysis, water quality-based effluent limits were developed for the following parameters: cadmium, chromium, copper, lead, mercury, silver, zinc, WAD cyanide, and WET. Appendix C provides an example of the reasonable potential calculation for cadmium.

C. Water Quality-Based Permit Limit Derivation

Once EPA has determined that a water quality-based limit is required for a pollutant, the first step in developing the permit limit is development of a wasteload allocation (WLA) for the pollutant. A WLA is the concentration (or loading) of a pollutant that may be discharged without causing or contributing to an exceedence of water quality standards in the receiving water. WLAs and permit limits are derived based on guidance in the TSD. WLAs for this permit were established in two ways: based on a mixing zone (e.g., for chronic criteria for metals, except for mercury) and based on meeting water quality criteria at "end-of-pipe" (for cyanide, mercury, and compliance with acute aquatic life criteria). The WLAs are then converted to long-term average concentrations (LTAs) and compared. The most stringent LTA concentration for each parameter is converted to effluent limits.

Calculation of WLAs: Where the state authorizes a mixing zone for the discharge, the WLA is calculated as a mass balance, based on the available dilution, background concentrations of the pollutant, and the water quality criterion. WLAs are calculated using the same mass balance equation used in the reasonable potential evaluation (see Equation 2). However, C_d becomes the criterion and C_e the WLA. Making these substitutions, Equation 2 is rearranged to solve for the WLA, becoming:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e} \qquad \text{(Equation 6)}$$

As discussed previously the aquatic life criteria for some metals is expressed as dissolved. However, the NPDES regulations require that metals effluent limits be based on total recoverable metals (40 CFR 122.45(c)). This is because changes in water chemistry as the effluent and receiving water mix could cause some of the particulate metal in the effluent to dissolve. Therefore, a translator is used in the WLA equation to convert the dissolved criteria to total. The translator is the same translator discussed in the reasonable potential evaluation in the previous section (the criteria conversion factors are used as the default translators). For criteria expressed as dissolved a translator is added to Equation 6 and the WLA is calculated as:

$$\text{WLA} = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e \times \text{translator}} \qquad \text{(Equation 7)}$$

In addition, for WET it is necessary to express the WLA in consistent toxicity units. Therefore, the acute WLA is converted into an equivalent chronic WLA by multiplying by the ACR (as discussed previously, the default ACR of 10 was used for the Grouse Creek data).

Where no mixing zone is allowed (e.g., for mercury and cyanide, and the acute criteria), the criterion becomes the WLA (see Equations 8 and 9). Establishing the criterion as the WLA ensures that the permittee does not contribute to an exceedence of the criteria.

no mixing zone: $\text{WLA} = \text{criterion}$ (Equation 8)

for criteria expressed as dissolved: $\text{WLA} = \text{criterion/translator}$ (Equation 9)

WLAs for the parameters that exhibited reasonable potential are provided in Tables B-6 and B-7. Appendix C demonstrates how the WLAs for cadmium were developed.

Calculation of Long-term Average Concentrations: As discussed above, WLAs are calculated for each parameter for each criterion. Because the different criteria (acute aquatic life, chronic aquatic life, human health) for the same parameter apply over different time frames and may have different mixing zones, it is not possible to compare the criteria or the WLAs directly to determine which criterion results in the most stringent limits. For example, the acute criteria are applied as a one-hour average and may have a smaller (or no) mixing zone, while the chronic criteria are applied as a four-day average and may have a larger mixing zone.

To allow for comparison, the acute and chronic aquatic life criteria are statistically converted to long-term average (LTA) concentrations. This conversion is dependent upon the coefficient of variation (CV) of the effluent data and the probability basis used. The probability basis corresponds to the percentile of the estimated concentration. EPA uses a 99th percentile for calculating a long-term average, as recommended in the TSD. The following equation from Chapter 5 of the TSD is used to calculate the LTA concentrations (alternately, Table 5-1 of the TSD may be used):

$$LTA = WLA \times \exp[0.5F^2 - zF] \qquad \text{(Equation 10)}$$

where: $F^2 = \ln(CV^2 + 1)$ for acute aquatic life criteria
$= \ln(CV^2/4 + 1)$ for chronic aquatic life criteria
CV = coefficient of variation
z = 2.326 for 99th percentile probability basis, per the TSD

Calculation of Effluent Limits: The LTA concentration is calculated for each criterion and compared. The most stringent LTA concentration is then used to develop the maximum daily (MDL) and monthly average (AML) permit limits. The MDL is based on the CV of the data and the probability basis, while the AML is dependent upon these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for the AML calculation and 99 percent for the MDL calculation. The MDL and AML are calculated using the following equations from the TSD (alternately, Table 5-2 of the TSD may be used):

$$MDL \text{ or } AML = LTA \times \exp[zF - 0.5F^2] \qquad \text{(Equation 11)}$$

for the MDL: $F^2 = \ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis, per the TSD

for the AML: $F^2 = \ln(CV^2/n + 1)$
n = number of sampling events required per month
z = 1.645 for 95th percentile probability basis, per the TSD

For setting water quality-based limits for protection of human health uses, the TSD recommends setting the AML equal to the WLA, and then calculating the MDL (i.e., no calculation of LTAs). The human health MDL is calculated based on the ratio of the AML and MDL as expressed by Equation 11. AML/MDL ratios are provided in Table 5-3 of the TSD.

The water quality-based effluent limits developed for each parameter that exhibited reasonable potential are shown in Tables B-6 and B-7. These tables also show intermediate calculations (i.e., WLAs, LTAs) used to derive the effluent limits. Appendix C demonstrates the permit limit calculation for cadmium in Outfall 002.

IV. Summary of Draft Permit Effluent Limitations

As discussed in Section I of this appendix, technology-based limits are applied to each discharge and evaluated (via the reasonable potential evaluation discussed in Section III) to determine whether these limits may result in any exceedences of water quality standards in the receiving water. If exceedences could occur, then water quality-based effluent limits are developed. The following summarizes the final proposed effluent limits developed for Outfall 002.

Metals: The technology-based effluent limits applicable to Outfall 002 were presented in Table B-1. The reasonable potential analysis demonstrated that discharge at the technology-based effluent limit concentrations have the potential to cause or contribute to exceedences of water quality standards in the receiving water, therefore water quality-based effluent limits were developed for cadmium, copper, lead, mercury, and zinc. Based on the reasonable potential analysis, water quality-based effluent limits were also developed for chromium and silver.

The existing permit contains effluent limitations for arsenic, iron, and nickel for Outfall 002. Since the reasonable potential analysis indicated no reasonable potential to cause or contribute to an exceedence of water quality criteria at the edge of the mixing zone, limits for these parameters were not included in the draft permit.

Cyanide: Based on the reasonable potential analysis, water quality-based effluent limits were developed for WAD cyanide. As discussed in the previous section, a mixing zone for cyanide was not incorporated into the effluent limits.

Whole Effluent Toxicity: Based on the reasonable potential analysis, water quality-based effluent limits were developed for WET. The limits were based on meeting the State water quality standard for toxicity (interpreted as 1 TU_c and 0.3 TU_a) at the edge of the 25% mixing zone for chronic criteria and at the end-of-pipe for acute criteria.

TSS: The State does not have a water quality standard for TSS. Therefore, the TSS limits included in the draft permit are the technology-based limits shown in Table B-1.

pH: The State water quality standard for pH is 6.5 - 9.5 standard units for the protection of aquatic life (see Table B-2). The technology-based effluent limits specify a pH of 6.0 - 9.0 (see Table B-1). The draft permit incorporates the more stringent water quality-based minimum of 6.5 and the technology-based maximum of 9.0 standard units.

The effluent limitations thus far have been expressed in terms of concentration. However, the TSD recommends that limits also be expressed in terms of loading, or mass (e.g., pounds/day). The following equation is used to convert the concentration-based limits into mass-based limits:

mass limit (lb/day) = concentration limit (ug/l) x effluent flow (cfs) x conversion factor (Equation 12)

where,

conversion factor = 0.005379 (to convert units on the right side of the equation to lb/day)

The mass-based limits are shown in Table 1 of the fact sheet.

Table B-4: Summary of Data Used to Determine Reasonable Potential and Develop Effluent Limits

Parameter	Effluent Data [1]			Receiving Water Upstream Concentration (C_u) [5]	
	Maximum Effluent Concentration [2]	Coefficient of Variation (CV) [3]	Reasonable Potential Multiplier (RPM) [4]	total	dissolved
Arsenic, ug/l	55	0.6	1.4	2.5	1
Cadmium, ug/l	100	0.6	1	na	0
Chromium, ug/l	14	0.6	1.4	na	0
Copper, ug/l	300	0.9	1	na	0
Lead, ug/l	600	0.6	1	na	0
Mercury, ug/l	2	0.6	1	0	0
Nickel, ug/l	30	0.6	1.4	0	0
Silver, ug/l	7	0.6	1.4	na	0
Zinc, ug/l	1500	0.8	1	na	0
WAD Cyanide, ug/l	110	0.5	1.3	12.3	na
Whole Effluent Toxicity (WET), TU_c	13.3	0.8	4.1	0	0

na = not applicable (receiving water concentrations are only needed for the form in which the criterion is expressed)

Footnotes:

1 - The effluent data is based on sampling of Outfall 002 conducted by Hecla and EPA since May of 1997 (when the treatment plant began operating). The metals data is expressed as the total form.

2 - For those parameters that have applicable technology-based effluent limitation guidelines (cadmium, copper, lead, mercury, and zinc), the maximum effluent concentration used in equations 3 and 4 is the maximum daily technology-based effluent limit (see Table B-1). The technology-based effluent limit is used since water quality-based effluent limits are only required if discharge at the technology-based limits have reasonable potential to exceed water quality standards in the receiving water. For parameters that do not have technology-based effluent limitation guidelines (arsenic, chromium, nickel, silver, WAD cyanide, and WET), the maximum measured effluent concentration is the maximum value measured in Outfall 002 since May of 1997.

3 - Where the majority of the effluent data was reported at less than detection limits, effluent-specific variability cannot be determined so a default CV of 0.6 was assumed. This was the case for all parameters except copper, zinc, cyanide, and WET. For these parameters adequate data existed to calculate the CV (standard deviation of the data divided by the mean).

4 - For parameters with technology-based effluent limitation guidelines, the RPM is 1. For other parameters the RPM is based on the CV and the number of data points (number of samples collected since May 1997). For metals and cyanide, 127 data points were available . For WET, 10 data points were available.

5 - The upstream concentrations are based on samples collected from Jordan Creek monitoring location S-3 (upstream of Outfall 002) since 1994 (the beginning of mining operations). For dissolved cadmium, copper, lead, mercury, silver, and zinc the analytical detection limits were not adequate to quantify background (all but one sample was reported at less than detection limits), therefore zero was used as C_u. No data was available for chromium, nickel and WET, therefore zero was used. For arsenic and WAD cyanide, C_u represents the 95th percentile of the data where ½ the detection limit was assumed for non-detected values.

TABLE B-5: Summary of Reasonable Potential (RP) Determination for Outfall 002

Parameter	RP for Jordan Creek Flows < 30 cfs				RP for Jordan Creek Flows $ 30 cfs			
	Maximum Projected Receiving Water Concentration (C_d)[2]			RP[2] (Yes or No)	Maximum Projected Receiving Water Concentration (C_d)[2]			RP[2] (Yes or No)
	aquatic life acute	aquatic life chronic	recreation		aquatic life acute	aquatic life chronic	recreation	
Arsenic, ug/l	77	61	38	No	77	27	11	No
Cadmium, ug/l	**98**	**74**	na	Yes	**100**	**33**	na	Yes
Chromium[1], ug/l	**19**	**15**	na	Yes	**19**	6.5	na	Yes
Copper, ug/l	**288**	**226**	na	Yes	**288**	**98**	na	Yes
Lead, ug/l	**557**	**438**	na	Yes	**596**	**204**	na	Yes
Mercury, ug/l	1.70	**1.70**	**0.96**	Yes	1.70	**1.70**	**0.23**	Yes
Nickel, ug/l	42	33	20	No	42	14	4.8	No
Silver, ug/l	**8.3**	na	na	Yes	**8.3**	na	na	Yes
Zinc, ug/l	**1470**	**1160**	na	Yes	**1470**	**506**	na	Yes
WAD Cyanide, ug/l	**143**	**143**	75	Yes	**143**	**143**	27	Yes
WET, TU_a for acute TU_c for chronic	**5.45**	**43**	na	Yes	**5.45**	**18.7**	na	Yes

na = not applicable (no criterion for comparison)

Footnotes:

1 - Chromium was assumed to be in the hexavalent form for comparison to the criteria for chromium-VI (the most stringent of the chromium criteria).

2 - Reasonable potential (RP) exists if the maximum projected receiving water concentration exceeds the criteria (applicable criteria are presented in Tables B-2 and B-3). The maximum projected receiving water concentrations in bold are those that exceed the criteria. The aquatic life maximum projected receiving water concentrations are expressed as dissolved for arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. All other metal concentrations in these columns are expressed as total.

TABLE B-6: Summary of Permit Limit Derivation for Outfall 002 at Jordan Creek Flows < 30 cfs

Parameter[1]	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentration		Limits Based on Recreational Criteria		Effluent Limits		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis[2]	maximum daily limit (MDL)	average monthly limit (AML)
Cadmium ug/l	1.32	0.685	0.424	0.361	na	na	chronic	1.1	0.56
Chromium ug/l	16	14.0	5.14	7.38	na	na	acute	16	8.0
Copper ug/l	7.3	6.73	1.64	2.72	na	na	acute	7.3	3.0
Lead, ug/l	24.6	1.22	7.9	0.644	na	na	chronic	2.0	1.0
Mercury, ug/l	2.0	0.012	0.771	0.0063	0.314	0.629	chronic	0.020	0.0098
Silver, ug/l	0.804	na	0.258	na	na	na	acute	0.80	0.40
Zinc, ug/l	52.7	60.7	13.1	26.7	na	na	acute	53	23
WAD Cyanide, ug/l	22	5.2	8.21	3.02	220,000	404,800	chronic	8.1	4.4
WET, TU_c	3.0	1.27	0.747	0.559	na	na	chronic	2.2	1.4

na = not applicable (no criterion for comparison)

Footnotes:

1- Parameters which exhibited reasonable potential (see Table B-5).

2- Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses and technology-based limits (Table B-1). The most stringent of these represent the final effluent limits.

TABLE B-7: Summary of Permit Limit Derivation for Outfall 002 at Jordan Creek Flows $ 30 cfs

Parameter[1]	Aquatic Life Criteria Wasteload Allocations (WLA)		Aquatic Life Criteria Long Term Average (LTA) Concentration		Limits Based on Recreational Criteria		Effluent Limits		
	acute WLA	chronic WLA	acute LTA	chronic LTA	WLA = AML	MDL	Basis[2]	maximum daily limit (MDL)	average monthly limit (AML)
Cadmium ug/l	0.82	1.12	0.263	0.590	na	na	acute	0.82	0.41
Chromium ug/l	16	32.2	5.14	17.0	na	na	acute	16	8
Copper, ug/l	4.8	10.6	1.08	4.27	na	na	acute	4.8	2.0
Lead, ug/l	14	1.59	4.49	0.84	na	na	chronic	2.6	1.3
Mercury, ug/l	2.0	0.012	0.771	0.0063	1.30	2.62	chronic	0.020	0.0098
Silver, ug/l	0.374	na	0.120	na	na	na	acute	1.1	0.55
Zinc, ug/l	36.2	95.7	9.02	42.1	na	na	acute	110	46
WAD Cyanide, ug/l	22	5.2	8.21	3.02	220,000	404,800	chronic	8.1	4.4
WET, TU_c	8.77	3.0	0.747	1.28	na	na	acute	3.0	1.9

na = not applicable (no criterion for comparison)

Footnotes:

1- Parameters which exhibited reasonable potential (see Table B-5).

2- Effluent limits based on the most stringent aquatic life criteria (lowest LTA) were compared to limits based on recreational uses and technology-based limits (Table B-1). The most stringent of these represent the final effluent limits.

APPENDIX C - EXAMPLE CALCULATIONS

This appendix demonstrates how the water quality-based analysis (reasonable potential determination and development of effluent limits) was performed using cadmium as an example.

Step 1: Determine the applicable water quality criteria.

Applicable water quality criteria for cadmium are provided in Table B-3.
The criteria applicable to low flow conditions (< 30 cfs in Jordan Creek) are:

aquatic life acute = 1.3 ug/l (expressed as dissolved)
aquatic life chronic = 0.51 ug/l (expressed as dissolved)

The criteria applicable to high flow conditions (> 30 cfs in Jordan Creek) are:

aquatic life acute = 0.82 ug/l (expressed as dissolved)
aquatic life chronic = 0.37 ug/l (expressed as dissolved)

Step 2: Determine if there is reasonable potential (RP) for the discharge to exceed the criteria in the receiving water.

To determine reasonable potential, the maximum projected receiving water concentration (C_d) is compared to the applicable water quality criteria. If C_d exceeds the criteria, then reasonable potential exists and a water quality-based effluent limit is established. Since the applicable criteria is expressed as dissolved, C_d is determined with Equations 3 and 4.

For the chronic criterion equation 3 applies, since a mixing zone is allowed:

$$C_d = \frac{\text{translator} \times (C_e \times Q_e) + [C_u \times (Q_u \times MZ)]}{Q_e + (Q_u \times MZ)}$$

For the acute criterion, equation 4 applies since no mixing zone is allowed:

$$C_d = \text{translator} \times C_e$$

The parameters to substitute in the above equations are:

translator = the water quality criteria conversion factor is used as the translator (see Appendix B, Section III.B.) The conversion factors for cadmium are based on hardness and calculated according to the equations shown in Table B-3.

> The hardness applicable to Outfall 002 under low flow conditions is 39 mg/l $CaCO_3$ (see page B-3). The conversion factors based on this hardness are:
>
> acute conversion factor = 1.136672 - (0.041838) ln (39) = 0.983
> chronic conversion factor = 1.101672 - (0.041838) ln (39) = 0.948
>
> The hardness applicable to Outfall 002 under high flow conditions is 25 mg/l $CaCO_3$ (see page B-3). The conversion factors based on this hardness are:
>
> acute conversion factor = 1.136672 - (0.041838) ln (25) = 1.00
> chronic conversion factor = 1.101672 - (0.041838) ln (25) = 0.967

C_e = maximum projected effluent concentration. This is determined via Equation 5:

> C_e = (max. measured effluent concentration) x RPM
>
> Since cadmium has a technology-based effluent limitation, the maximum technology-based effluent limitation (100 ug/l) is used as the maximum effluent concentration and the RPM is 1 (see Table B-4 and footnotes 2 and 4 of that table). Therefore, C_e is calculated as:
>
> C_e = (100 ug/l) x 1 = 100 ug/l

C_u = upstream receiving water concentration = 0 ug/l, dissolved (see Table B-4).

Q_e = maximum effluent flow (see page B-9)
= 1.1 cfs for low flow conditions
= 3.9 cfs for high flow conditions

Q_u = upstream receiving water flow (see page B-9)
= 1.2 cfs for low flow conditions
= 30 cfs for high flow conditions

MZ = mixing zone (see page B-9)
= 0.25 for comparison to chronic criterion
= 0 for comparison to acute criterion

Now plugging the above values into equations 3 and 4 and solve:

For low flow condition:
Determine the reasonable potential to exceed the chronic criterion (solve equation 3):

$$C_{d,\ chronic} = \frac{(0.948)(100)(1.1) + (0)\ (1.2)(0.25)}{1.1 + (1.2)(0.25)} = 74 \text{ ug/l}$$

Since the maximum projected receiving water concentration (C_d = 74 ug/l) exceeds the chronic aquatic life criterion (0.51 ug/l), there is reasonable potential for the effluent to cause an exceedence of the water quality standard, and a water quality-based effluent limit is required.

Determine the reasonable potential to exceed acute aquatic criterion (solve equation 4):

$$C_{d,\ acute} = 0.983 \times 100 = 98 \text{ ug/l}$$

Since the maximum projected receiving water concentration exceeds the acute aquatic life criterion (1.3 ug/l), there is reasonable potential for the effluent to cause an exceedence of the water quality standard, and a water quality-based effluent limit is required.

Perform the same calculations for the high flow condition:
Determine the reasonable potential to exceed the chronic criterion (solve equation 3):

$$C_{d,\ chronic} = \frac{(0.967)(100)(3.9) + (0)\ (30)(0.25)}{3.9 + (30)(0.25)} = 33 \text{ ug/l}$$

Since the maximum projected receiving water concentration (33 ug/l) exceeds the chronic aquatic life criterion (0.37 ug/l), there is reasonable potential for the effluent to cause an exceedence of the water quality standard, and a water quality-based effluent limit is required.

Determine the reasonable potential to exceed acute aquatic criterion (solve equation 4):

$$C_{d,\ acute} = 1.0 \times 100 = 100 \text{ ug/l}$$

Since the maximum projected receiving water concentration exceeds the acute aquatic life criterion, there is reasonable potential for the effluent to cause an exceedence to the water quality standard, and a water quality-based effluent limit is required.

NOTE: If reasonable potential exists to exceed any one of the criteria, water-quality based effluent limits are required.

<u>Step 3: Since there is reasonable potential, determine the wasteload allocations (WLAs):</u>

Since the applicable criteria are expressed as dissolved, the WLAs for cadmium are calculated using equations 7 and 9:

For the chronic criteria, a mixing zone is allowed, therefore Equation 7 applies:

$$WLA = \frac{\text{criterion} \times [Q_e + (Q_u \times MZ)] - (C_u \times Q_u \times MZ)}{Q_e \times \text{translator}}$$

For the acute criteria, no mixing zone is allowed, therefore Equation 9 applies:

$$WLA = \text{criterion}/\text{translator}$$

The variables in the WLA equation have already been defined in Steps 1 and 2.

Plugging these into the above equations and solving.

<u>For low flow conditions:</u>
Determination of WLA for protection of chronic aquatic life (solve Equation 7):

$$WLA_{chronic} = \frac{(0.51)[1.1 + (1.2)(0.25)] - (0)(1.2)(0.25)}{1.1\ (0.948)} = 0.685 \text{ ug/l}$$

Determination of WLA for protection of acute aquatic life (solve Equation 9):

$$WLA_{acute} = 1.3/0.983 = 1.32 \text{ ug/l}$$

<u>For high flow conditions:</u>
Determination of WLA for protection of chronic aquatic life:

$$WLA_{chronic} = \frac{(0.37)[3.9 + (30)(0.25)] - (0)(30)(0.25)}{3.9\ (0.967)} = 1.12 \text{ ug/l}$$

Determination of WLA for protection of acute aquatic life:

$$WLA_{acute} = 0.82/1.0 = 0.82 \text{ ug/l}$$

Step 4a: Develop Long-term Average Concentrations Based on the WLAs.

Effluent limits are developed by converting the WLAs to long-term average concentrations (LTAs). The most stringent LTA is used to develop the effluent limits. The aquatic life WLAs are converted to LTAs using Equation 10:

$$LTA = WLA \times \exp[0.5F^2 - zF]$$

where,

$z = 2.326$ for 99^{th} percentile probability basis (per the TSD)
CV = 0.6 (see Table B-4)

for acute criteria, $F^2 = \ln(CV^2 + 1) = \ln(0.6^2 + 1) = 0.3075$
for chronic criteria, $F^2 = \ln(CV^2/4 + 1) = \ln(0.6^2/4 + 1) = 0.0862$

Plug the above values and the WLAs from step 4 into equation 10 and solve:

For low flow conditions:

$$LTA_{chronic} = (0.685) \times \exp[0.5(0.0862) - (2.326)(0.2936)] = 0.361 \text{ ug/l}$$

$$LTA_{acute} = (1.32) \times \exp[0.5(0.3075) - (2.326)(0.5545)] = 0.424 \text{ ug/l}$$

Since the LTA concentration based on the chronic criterion is more stringent than the LTA based on the acute criterion, the chronic LTA is used to derive the aquatic life effluent limits.

For high flow conditions:

$$LTA_{chronic} = (1.12) \times \exp[0.5(0.0862) - (2.326)(0.2936)] = 0.590 \text{ ug/l}$$

$$LTA_{acute} = (0.82) \times \exp[0.5(0.3075) - (2.326)(0.5545)] = 0.263 \text{ ug/l}$$

Since the LTA concentration based on the acute criterion is more stringent than the LTA based on the chronic criterion, the acute LTA is used to derive the aquatic life effluent limits.

Step 4b: Develop Effluent Limits Based on the LTA.

The most stringent LTA concentration for each flow condition is converted to a maximum daily limit (MDL) and average monthly limit (AML) via Equation 11:

$$MDL, AML = LTA \times \exp[zF - 0.5F^2]$$

where,

for the MDL: $z = 2.326$ for 99th percentile probability basis (per the TSD)
$F^2 = \ln(CV^2 + 1) = \ln(0.6^2 + 1) = 0.3075$

for the AML: $z = 1.645$ for 95th percentile probability basis (per the TSD)
$F^2 = \ln(CV^2/n + 1) = \ln(0.6^2/4 + 1) = 0.0862$
since n = number of samples per month = 4
(weekly monitoring for cadmium),

Substituting the above values and the lowest LTA concentrations from Step 4a into equation 11 and solving:

For low flow conditions:

$$MDL = (0.361) \exp[(2.326)(0.5545) - 0.5(0.3075)] = 1.12 \text{ ug/l}$$

$$AML = (0.361) \exp[(1.645)(0.294) - 0.5(0.0862)] = 0.56 \text{ ug/l}$$

For high flow conditions:

$$MDL = (0.263) \exp[(2.326)(0.5545) - 0.5(0.3075)] = 0.82 \text{ ug/l}$$

$$AML = (0.263) \exp[(1.645)(0.294) - 0.5(0.0862)] = 0.41 \text{ ug/l}$$

These are the effluent limits for cadmium for outfall 002 in the draft permit.

<u>Step 4c: Develop Mass-based Limits.</u>

The effluent limits are also expressed in terms of mass. The mass loading limits are determined using Equation 12:

mass limit (lb/day) = concentration limit (ug/l) x effluent flow rate x 0.005379

where, effluent flow rate = 1.1 cfs for low flow limits
= 3.9 cfs for high flow limits

<u>For low flow conditions:</u>

mass-based MDL = 1.1 x 1.1 x 0.005379 = 0.0065 lb/day

mass-based AML = 0.56 x 1.1 x 0.005379 = 0.0033 lb/day

<u>For high flow conditions:</u>

mass-based MDL = 0.82 x 3.9 x 0.005379 = 0.017 lb/day

mass-based AML = 0.41 x 3.9 x 0.005379 = 0.0086 lb/day

These are the mass-based limits for cadmium in the draft permit.

APPENDIX D - ENDANGERED SPECIES ACT

As discussed in Section IX.A. of the fact sheet, Section 7 of the Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) regarding potential affects a federal action may have on threatened and endangered species. In response to a request for a list of threatened and endangered species in the vicinity of the discharge, the USFWS identified the following federally-listed species in a letter dated October 15, 1999. The species denoted by a * are under the jurisdiction of the NMFS:

<u>Endangered Species:</u>

Gray Wolf (*Canis lupus*) - experimental
Sockeye salmon (*Oncorhynchus nerka*) *

<u>Threatened Species:</u>

Bald Eagle (*Haliaeetus leucocephalus*)
Spring/summer and fall chinook salmon (*Oncorhynchus tshawytscha*) *
Steelhead (*Oncorhynchus mykiss*) *
Bull Trout (*Salvelinus confluentus*)
Ute' ladies-tresses (*Spiranthes diluvialis*)

<u>Proposed Species</u>:

Lynx (*Lynx canadensis*)

In addition to these species, the USFWS has listed two species of concern: wolverine (*Gulo gulo luscus*) and white sturgeon (*Accipenser gentilis*).

In August 1997, NMFS issued a Biological Opinion (BO) on the entire GCU (including the NPDES discharge). The purpose of the BO was to determine if the GCU operations are likely to affect the Snake River chinook salmon and sockeye salmon or affect their designated critical habitat. In the BO, NMFS determined that the mining activities:

- are likely to cause the destruction or adverse modification of critical habitat and jeopardize the continued existence of Snake River spring/summer chinook salmon

- are not likely to cause the destruction or adverse modification of critical habitat or jeopardize the continued existence for Snake River sockeye salmon

NMFS developed a reasonable and prudent alternative (RPA) and reasonable and prudent measures (RPMs) that, if implemented, would allow for the continued operation of the GCU and avoid the likelihood of jeopardizing the continued existence of the chinook salmon and avert the destruction or adverse modification of critical habitat. Parts of the RPA and some of the RPMs (which are implemented by "Terms and Conditions") relate to the NPDES permit. Following is a brief discussion of those items and how they were incorporated into the draft permit.

RPA, item B: NMFS was concerned with the potential adverse affect of flocculant use on the salmon or their habitat in Jordan Creek. Specifically, this RPA item stated that flocculants shall not be released into waters that flow into Jordan Creek unless the flocculants have been thoroughly studied to determine their effects to salmon and their habitat. Flocculant is a necessary component of Hecla's wastewater treatment process to promote settling of solids. Most of the flocculant added is contained within the settled solids and does not enter the wastewater discharge. However, whole effluent toxicity (WET) limits have been incorporated into the permit. The WET limits prohibit discharge of substances (such as flocculant or other chemicals that may not have water quality criteria upon which to base effluent limits) in toxic amounts consistent with the state water quality standards.

RPA, item C: This RPA item requires that all exceedences of ambient water quality criteria in Jordan Creek shall be evaluated for causality mechanics and a solution developed for each causality mechanism. The proposed NPDES permit requires monitoring of both the Outfall 002 effluent and the receiving water. The effluent limits in the permit are based upon water quality criteria applicable to Jordan Creek. The proposed permit requires that Hecla report any exceedences of the effluent limits or any noncompliance that may endanger the environment within 24 hours. Hecla must also report on the steps taken to reduce, eliminate, and prevent recurrence of the noncompliance. Depending upon the nature and extent of the violations, EPA will determine what further action(s) are necessary. These may include the investigations described in this RPA item.

RPA, item D: The portion of this RPA item applicable to the NPDES discharge is the requirement that laboratory analytical techniques be revised so that detection limits do not exceed either acute or chronic water quality criteria. As discussed in Section VII.C. of the fact sheet, the draft permit specifies method detection limits below the water quality criteria.

RPA, item F: A portion of this RPA item requires that BMPs be monitored for effectiveness during and after spring thaws and storm events, that any BMP failures be repaired promptly, and that a BMP report shall be prepared that documents BMP implementation, monitoring, maintenance, and effectiveness. These items are consistent with BMP requirements in the draft permit.

RPM Term and Condition # 2: This RPM requires that the USFS ensure compliance with the requirements in the NPDES permit. EPA will ensure compliance with the permit.

RPM Term and Condition # 3: This RPM requires that the USFS estimate the potential effects on salmonids from the NPDES outfall. As discussed below, EPA is evaluating the potential impacts of the outfall on all of the listed species. Results of this evaluation will be submitted to NMFS and USFWS in a Biological Evaluation (BE).

<u>RPM Term and Condition # 4:</u> This RPM requires that results of surface water quality monitoring required under the NPDES permit be submitted to NMFS. The draft permit incorporates this requirement.

As well as incorporating the RPAs and RPMs into the draft permit, EPA is undergoing informal consultation with the Services. As part of the consultation, EPA is preparing a Biological Evaluation (BE) to evaluate potential impacts of the NPDES discharge on the endangered and threatened species. If the consultation results in additional RPAs or RPMs that require more stringent permit conditions, EPA will incorporate those conditions into the final permit.

APPENDIX E - REFERENCES

EPA 1991. *Technical Support Document for Water Quality-based Toxics Control*. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, D.C., March 1991. EPA/505/2-90-001.

EPA 1992. NPDES Permit No. ID-002646-8, Hecla Mining Company, Grouse Creek Project. Issued October 6, 1992.

EPA, 1996a. *EPA Region 10 Guidance For WQBELs Below Analytical Detection/Quantitation Level. NPDES Permits Unit*, EPA Region 10, Seattle, WA. March 1996.

EPA, 1996b. *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion*, EPA 823-B-96-007, June 1996.

Hecla Mining Company (Hecla). March 1992. *Plan of Operations for the Grouse Creek Project*.

Hecla. July 1993. Grouse Creek Project Comprehensive Water Quality Monitoring Plan.

Hecla. June 1995. Grouse Creek Unit Storm Water Pollution Prevention Plan.

Hecla. May 2, 1997. NPDES Permit Renewal Application for the Grouse Creek Unit.

Hecla. April 3, 1998. NPDES Permit No. ID-002646-8, Grouse Creek Unit, Submittal of Additional Information.

Hecla. April 20, 1998. NPDES Permit No. ID-002646-8, Grouse Creek Unit, Submittal of Additional Information.

Hecla. December 22, 1998. NPDES Permit No. ID-002646-8, Grouse Creek Unit, Supplemental Information to Support Flow Proportion Discharge Limitations.

Hecla. July 15, 1997. NPDES Renewal Application - Responses to EPA's Comments Dated March 19, 1999, Grouse Creek Unit.

Hecla. August 27, 1999. NPDES Permit No. ID-002646-8, Grouse Creek Unit, Submittal of Additional Information.

National Marine Fisheries Service (NMFS), Northwest Region. August 25, 1997. Endangered Species Act - Section 7 Consultation, Biological Opinion, Hecla Mining Company - Grouse Creek Unit.